Helicobacter pylori before and after the kidney transplantation

PhD thesis

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1 Introduction

The solid organ transplantation belongs to the great success stories of the XXth. century. Life expectancy and quality of life are affected by the side effects rather than the transplantation itself. Upper gastrointestinal (GI) symptoms are frequent in organ transplant recipients. Peptic ulcer and related pathologies such as gastritis and duodenitis are known to occur with increased frequency (20-60%) and severity in renal transplant recipients. The frequency of severe complications is about 10% and 10% of those might prove fatal. Ulcer disease is one of the most important GI disorders. Peptic ulcer was a frequent cause of mortality until a few years ago, accounting for about 4% of deaths after transplantation. Historically ulcer healing was required for performing kidney transplant. More recently, however, the prognosis has improved and mortality or graft losses because of peptic ulcer have become exceptional. Today, many transplant groups use prophylactic acid supressive therapy (AST) after operation. Despite of that there is no data of frequency of ulcer disease of endoscopically examined kidney transplant recipients. GI symptoms at the immediate perioperative period may be caused by uraemia, stress, and the operation itself. Later on, the patients have to take numerous pills every day. The role of corticosteroids is still controversial but it is likely that the high doses of corticosteroids used for treating rejection may have an ulcerogenic effect. Nausea, vomiting, dyspepsia, and anorexia are particularly frequent in patients given mycophenolat-mofetil (MMF). Other causes of gastroduodenal disorders include Helicobacter pylori, cytomegalovirus (CMV) and mycotic infections.

Over the last 25 years, there has been considerable interest in the role of H. pylori in the pathogenesis of gastritis and peptic ulceration in the general population. However, results of earlier studies concerning dialysis and/or transplant patients are conflicting. Statements about H. pylori infection frequency in these populations vary from ‘less than normal population’ up to ‘higher as in the normal’, but very few studies checked a considerable number of patients. Published data of sero-positivity vary from 31% to 92%. In the general population only 15% of H. pylori infected persons develop peptic ulcer disease, suggesting that specific factors are required for ulceration to occur. Genetic variability influences susceptibility to several diseases. HLA-class II genes (located at the 6th chromosome) have been repeatedly investigated as candidate genes for predisposition to H. pylori infection. So far, the reported results are conflicting on that count too. Results from other ethnically different (mainly Chinese and Japanese) populations are variable.

A debate is still ongoing on the clinical significance of the presence of the H.pylori in the stomach after transplantation.

Although upper GI endoscopy is part of the everyday medical practice, only few studies have been done on the endoscopic findings of renal patients and include only small numbers. Treatment of these complains are based mainly on local habits and theories. The gastrointestinal tract accounts for a large component of non–allograft-related complications seen after all types of solid organ transplantation. Serious GI complications are responsible for 1-4% of mortality after kidney transplant. Majority of the complications requiring operation occurs urgently with a mortality rate of 30%. 5-year patient survival rate in patients with a first year complication is 68% compared to 88% in patients with a later or no GI complication. GI complications might require dose reduction or the discontinuation of some of the immunosuppressive medications, affecting graft survival.

2 Aims

1. How frequent is the H.pylori in uraemic patients listed for kidney transplantation?
2. Is there any difference comparing it to the general population in Hungary? Is there any decrease expected from the literature?
3. What environmental circumstances affect the H.p. sero-prevalence?
4. Is there any relation between the HLA-alleles and H.p. infection?
5. What is the role of the endoscopy in the follow up?
6. Which are the most frequent GI disorders after transplantation?
7. What kinds of GI disorders are induced by the immunosuppression?
8. What is the true prevalence of H.pylori after the kidney transplantation? Has it the same importance, as in the general population?
9. What is the utility of the routine ulcer prophylaxis?
10. Is there any relation between the GI complains and the
11. Which is most vulnerable period?

3 Materials, methods, patients

3.1 Patients

3.1.1 Patients of the sero-epidemiologic study

Data of 726 consecutive uraemic, transplant candidate patients were collected between 2001 and 2006. 58.7% of the patients were male, 41.3% were female and 6.3% (46) were children (under 18 years). The mean age was 45.1 years (3–73, SD: ±14.65), the same in male and female patients.

3.1.2 Patients of the endoscopy

From 1994 to 2007, 2143 kidney transplants were performed in our centre. 672 upper GI endoscopies were done in 543 kidney transplant patients (25.3% of recipients). Of those 56.9% were male, mean age was 49.5±12.8.

3.2 Serology and HLA-typing

H. pylori serology was studied by measuring specific H. pylori IgG. The assay principle combines an enzyme immunoassay sandwich method with a final fluorescent detection. HLA-A, HLA-B and HLA-C typing was performed by the standard NIH microlymphocytotoxicity method. Before 2006, HLA-DR and HLA-DQ antigens were determined on B-enriched lymphocyte suspensions. Now HLA-DR and HLA-DQ antigens are determined by a DNA-based PCR-SSP technique.

3.3 Endoscopy

Two senior surgeon-gastroenterologists performed all the endoscopic examinations (EGD), in case of relevant clinical indication. The upper gastrointestinal tract was examined. The endoscopic abnormalities were evaluated according to international standards (Savary-Miller and Sydney-system). Forceps mucosal biopsies were taken from a specific lesion (e.g. ulcer) if present and from every patient from the first part of the duodenum, the gastric antrum and the gastric corpus (2-2 biopsy samples from each localization). Biopsy samples were investigated by conventional histology for mucosal changes (haematoxylin-eosin and Giemsa) and by PCR for CMV-DNA. Patients were considered H.pylori positive, if histology, CMV positive if PCR proved its presence. Mycosis was diagnosed by its characteristic macroscopic features.

3.4 Socio-economic study

In 2004, a socio-economic study was performed using a questionnaire containing 25 questions about living conditions.

3.5 Immunosuppression

The immunosuppressive (IS) medication used at the time of endoscopy was collected and analysed. The most frequently used (75.1%) immunosuppressive combinations were cyclosporine-mycophenolat mofetil-steroid (CSA-MMF-ST) triple (51.2%), cyclosporine-steroid (CSA-ST) double (27.3%) and tacrolimus-mycophenolat-steroid (TAC-MMF-ST) triple (21.5%) therapy. All other combinations occurred in less than 5% in that material, and these were excluded from immunosuppressive-analysis.

3.6 Ulcer prophylaxis

Data of acid suppressive therapy (AST) *before* endoscopy was collected and analysed. Nearly all (97.8%) patients got AST. Out of them 56.2% received histamine receptor antagonist (H_2RA), 43.8% proton pump inhibitor (PPI), without age or gender difference. There was a variable usage of PPI-s and H_2 receptor antagonists; however, the general trend of the rate did not change during the study period. There was no difference between the IS groups according to AST, p=0.26.

3.7 Statistics

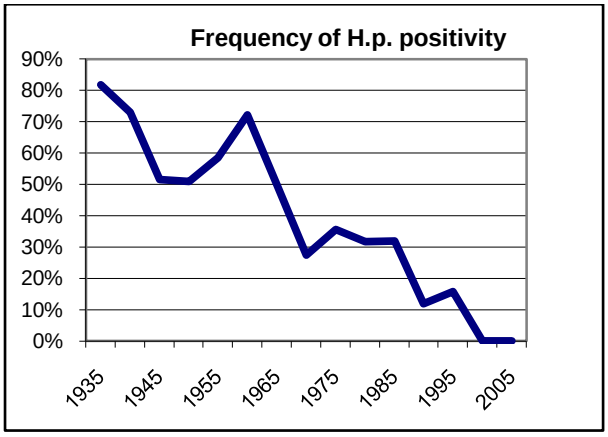
Qualitative data were analysed by Fisher's exact test or with "2 by k" chi-square test with a two-sided probability value. Continuous variables were presented mean or median and compared using the Mann-Whitney U or Kruskal-Wallis test. The influence of risk factors was quantified using odds ratio (OR). P values of below 0.05 were considered significant. Statistics were performed using StatSoft, Inc. (2008). STATISTICA (data analysis software system), version 8.0. www.statsoft.com.

4 Results

4.1 Serology and HLA

4.1.1 Helicobacter pylori and sero-epidemiology

Serologic testing for H. pylori was uncertain in 17 cases (2.34%) and thus, these cases were excluded from analysis. Of the remaining 709 patients, 350 (49.37%) were H. pylori seropositive and 359 (50.63%) were seronegative, without differences according to gender. In the first year (2001) of our study, sero-positivity rate was at 62.5%, whereas for 2006 it gradually decreased to 35%. Mean age of positive patients was 48.9 years (9–74, SD: ±11.74), whereas the mean age of negative patients was 41.0 years (3–71, SD: ±16.1); this difference was highly significant ($p<0.0001$). Taking into account only the adults (>18 years), mean ages of positive and negative patients were 49.5 and 44.6 years, respectively, $p<0.001$. H. pylori occurred mainly among elderly patients: only 13% were under 18 years and more than 60% were over 60 years. There was no change in the mean age of patients during the study period. I investigated the H.p. prevalence in five birth-year groups. The prevalence of infection decreased strongly with year of birth, and not with the age itself (Figure 1.)



1. Figure Sero-positivity rate of H.p. according to year of birth

4.1.2 Socio-economic study

The presence of H.p. did not differ according to family size: it was 51% is small and 58% in larger families, $p=0.74$. Sero-prevalence was independent from qualification of both the parents ($p=0.12$) and the patients ($p=0.74$). Neither childhood's nor present place of residence (small village or town/capital) affected to rate of H.p. infection. There was no difference in

tap water (p0.61), sewerage (p=0.32), pet (p=0.44), garden (p=0.99), alcohol consumption (p=0.13), smoking habits (p=0.55).

4.1.3 HLA distribution

The association between the HLA and H. pylori serologic status was analyzed by comparing the carrier frequency (frequency of individuals positive for a particular allele) of seronegative and seropositive patients. No difference was found in class I (HLA-A, B, C) antigens.

HLA-DR12 occurred in 37 (5.1%) patients. It was significantly more frequent in the H. pylori positive group: 7.7 versus 2.8% and vice versa: of 37 patients carrying DR12, 27 (73%) were H. pylori positive and 10 (27%) were negative (P=0.0037). Carrier status of DR12 had an OR: 2.91 (1.34–6.85 CI:95%) of H. pylori infection. The same was observed by DR16 status, which occurred in 62 (8.54%) patients. None of the children carried DR16, so the DR16 negative group proved to be significantly (p=0.0047) younger; DR16 as a possible risk factor was excluded (Table 1.).

Table 1. Number and rates of HLA-DR alleles

HLA-DR allele	H.pylori pos. No.	%	H.pylori neg. No.	%	P
1	81	23,1%	101	28,1%	n.s.
2	99	28,3%	89	24,8%	n.s.
3	69	19,7%	73	20,3%	n.s.
4	71	20,3%	87	24,2%	n.s.
5	137	39,1%	127	35,4%	n.s.
6	117	33,4%	102	28,4%	n.s.
7	75	21,4%	84	23,4%	n.s.
8	12	3,4%	22	6,1%	n.s.
9	7	2,0%	2	0,6%	n.s.
10	8	2,3%	5	1,4%	n.s.
11	106	30,3%	105	29,2%	n.s.
12	27	7,7%	10	2,8%	0,0037

The third allele with significant difference was DQ1, when it was assessed separately. Then I analyzed data of patients carrying DQ1 but not DR12 (356 patients), and those with DQ1 but not DR16 (328 patients). These groups did not show any difference, P values were 0.07 and

0.09, respectively. DQ1 as risk factor was excluded as well. The HLA allele's frequencies in the general population of Hungary were known from the data of organ and bone marrow donor registry. The HLA-DR12 allele's frequency was 3.76% in the general population. This figure did not significantly differ from the investigated uraemic patients population's 5.1% frequency, P=0.13. The HLA-DR16 allele's frequency in the general and in the uraemic patients population was 10.52 and 8.54%, respectively, P=0.23. The HLA-DQ allele's frequency in the Hungarian bone marrow donor registry and in our uraemic patients was 64.3, and 55.6%, respectively, P<0.05

4.2 Endoscopy

We performed 56/year upper endoscopies in average for kidney transplant patients. The yearly fluctuation of it follows the numbers of transplantations.

4.2.1 Indication

The most frequent indications for endoscopy were pain (46.2%), dyspeptic complaints (23.2%), bleeding (18.4%) and anaemia (10.7%). There were some other non-specific or "ad hoc" indications like unknown fever, percutaneous endoscopic gastrostomy, jaundice, portal hypertension, food-block, recurrent pancreatitis.

4.2.2 Disorders

The most frequent indications are presented in Table 2. Only 16.2% of the patients examined had absence of any endoscopic findings.

Table 2. Endoscopic disorders

Inflammation	46,7%
Oesophagitis	24,9%
Ulcer	16,9%
Erosion	14,8%
Varicosity	3,8%
Polypoid laesions	2,9%
Negative	16,2%

Out of 92 ulcer patients 52 (56.5%) had gastric, 33 (35.8%) duodenal and 7 (7.6%) had both kinds of ulcer. In five cases, malignant tumour was suspected during the endoscopy with three of them histologically proven: one was MALT-lymphoma, the others were adenocarcinomas.

4.2.3 Histology

Histological examinations were completed in 484 patients. Histologic abnormalities, mainly inflammatory alterations, were proven in 84.6% of patients. Metaplasia was observed in 2.2% (10 patients), tumour in 1.2% (6 pts.). Histology proved the presence of two carcinoid, three adenocarcinomas and one MALT-lymphoma.

4.2.4 Infections

4.2.4.1 Helicobacter pylori

Out of the histologically examined 481 patients, the presence of Helicobacter pylori was verified in 101 cases, representing 20.9%. The mean age of H. pylori positive and negative patients was 50.5+10.4 and 49.2+13.3 years, respectively, p=0.53. There was no difference according to gender, p=1.0. While the specificity of RUT was 98.5%, its sensitivity was only 38.5%, so we stopped performing it in 2004.

The presence of H.pylori was not associated with the presence of peptic ulcer: 20 of 101 H.pylori positive patients as compared to 57 of 380 H. pylori negative patients had ulcer (p=0.28). 26% of ulcer patients were positive for H. pylori. There were no significant associations between positivity for H. pylori and erosions, oesophagitis, macroscopic signs of inflammation, metaplasia, or atrophy (p values are as follows: 0.41; 0.8; 0.57; 0.74; 0.58; respectively).

4.2.4.2 Cytomegalovirus

The presence of cytomegalovirus (CMV) in the GI mucosa was proven in 53.4% of the patients. There was no difference in the mean age (p=0.63) or the gender (p=0.56) between positive and negative patients for CMV. The presence of CMV was not associated with ulcer, with the occurrence of erosions, oesophagitis, the macroscopic findings of inflammation, or with metaplasia and atrophy (p values p=0.65; 0.52; 0.89; 0.81; 0.29; 0.25, respectively). The presence of Helicobacter plyori was not correlated with a positive PCR for CMV, p=1.0.

4.2.4.3 Mycosis

Mycotic infection, mainly oesophageal candidiasis, was seen in 11.2% of the patients. It was strongly associated with oesophageal ulceration (OU): 6 out of 61 patients with, and 16 out of 481 patients without mycosis had OU, p=0.028, OR=2.57, (1.19-4.85 CI:95%). Mycosis had no association with either duodenal or gastric ulceration, p=0.47.

4.2.5 Immunosuppressant's impact

In the main IS groups there were no differences in the incidence of negative findings (p=0.53), inflammation (p=0.15), ulcer (p=0.77), and oesophagitis (p=0.47) and the presence of H. pylori (p=0.44). However, there were differences in the incidence of erosive laesions and the presence of CMV (Table 3.)

Table 3. Erosions and CMV with IS combinations

Immunosuppression	Erosion	CMV
CSA-ST	15,9 %	31,1%
CSA-MMF-ST	18,4%	57,8%
TAC-MMF-ST	24,4%	66,1%
p (between groups)	0,03	0,001
p (trend)	0,01	0,0006

MMF was proven as an independent risk factor for both erosive lesions, {OR: 1.83 (1.02 - 3.3, CI:95%)} and CMV {OR: 2.25 (1.34-3.79 CI:95%)}.

4.2.6 Acid supressive therapy's impact

I compared the H_2RA and PPI groups according to the indications, observed diagnoses and infections. The only significant difference was in the presence of H.pylori; it was less frequent in the PPI group (Table 4).

Table 4. Complains and alterations in the AST groups

	H_2RA	PPI	p
Pain	48,6%	47,4%	0,90
Dyspepsia	25,3%	21,9%	0,56
Bleeding	15,1%	15,8%	0,86
Erosion	17,1%	14%	0,61
Oesophagitis	28,8%	36,1%	0,68
Ulcer	16,4%	10,5%	0,21
inflammatio	43,8%	43,9%	1,0
CMV	57,4%	57,1%	1,0
mycosis	7,9%	13,7%	0,17
H.pylori	22,6%	12,4%	0,045

4.2.7 Renal function's impact

The renal function was described by the creatinine level. The vast majority of the patients had a good renal function, median creatinine reading was 137 µmol/l (60-700, SD±103.5). It had no impact on GI complains, endoscopic findings or infections.

Table 5. Creatinine levels (µmol/l)

	present	not present	p
Anaemia	170	130	0,11
Dyspepsia	125	140	0,84
Pain	130	138	0,49
Shrinkage	186	130	0,19
Erosion	150	130	0,23
oesophagitis	128	141	0,94
Ulcer	120	140	0,19
H.pylori	130	140	0,85
CMV	140	150	0,93
Candidiasis	175	130	0,08

4.2.8 Timing of endoscopy

The time between transplantation and endoscopy varies from three days up to almost 19 years, median was 3.39y. However, 29% (157) of patients were examined in the first posttransplant year, and 58.5% (92) of them, which is 16.9% of all, in the first three months. Of those having pain median time was significantly shorter (p=0.00014). Ulcer was more commonly found in patients requiring earlier endoscopy (1.65 vs. 3.66 years for patients where no ulcer was found (p= 0.009). The frequency of ulcer disease was 29.3% of the examinations in the first three months, 26.3% in the first year, and only 12.9% later on, p=0.0014. 27 (29.3%) out of 92 ulcers developed in the first three months, 42 (45.7%) in the first year, and all the others in a constant rate later on (Figure 2).

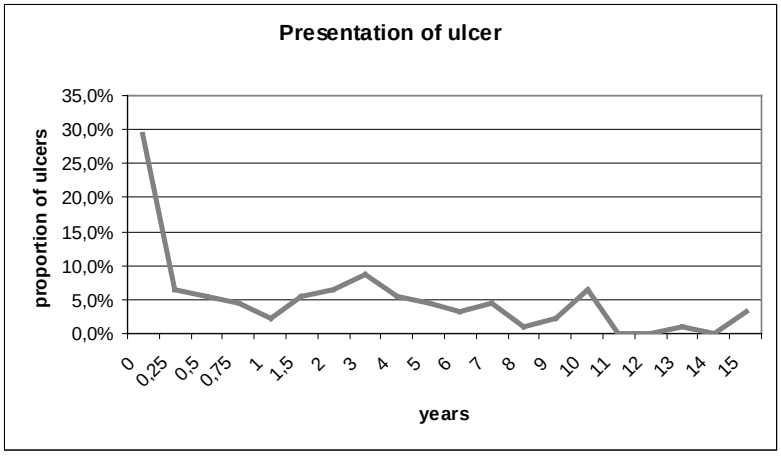


Figure 2. Rate of the ulcers in time

The positivity rate of H.p. on examination decreased in time, but was statistically non-significant (p=0.09), rate of CMV did not change at all (p=0.42).

Comparing the AST groups revealed that more patients required endoscopy in the first year from the H_2RA group (35%) then from the PPI group (25%). Although statistically it is just not significant (p=0,063), it might have clinical relevance. The same was observed when comparing the IS-groups. 23.7% of those on CSA-St regimen required endoscopy in the first year, while it was 35.5% of CSA-MMF-ST patients and 38.5% of TAC-MMF-ST patients, p=0.056.

5 Conclusions

1. In the whole investigated uraemic population sero-positivity for the Helicobacter pylori was 49.3%, owing to the cohort effect. It decreased gradually from 65% to 35% in investigation period. Analyzing the birth-year groups, I concluded that prevalence of infection decreases strongly with year of birth, and not with age itself, as H. pylori infection is typically acquired in early childhood.
2. Decreased infection rate of uraemic patients and the general population ran together. We published our observations and opinion based on the largest database in the literature.
3. My questionnaire-based investigation did not prove the expected relationships between H.pylori infection environmental circumstances.
4. Our work is the first observation of any possible relationship between H. pylori and HLA-DR12. The carrier status of HLA-DR12 might be associated with an H. pylori seropositive status OR: 2.91 (1.34–6.85 CI:95%). This observation is the most

important novelty of my work. Frequency of DR12 was the same in the uraemic and the general population.

5. According to my study, at least 25% of all patients require upper endoscopy in their "posttransplant life". I did not find data to compare this rate. The observed 84% rate of clinically significant endoscopic findings is much higher ($p<0.0001$) than expected from data of general gastroenterology patients, where this figure is around 58%. This is another important novelty of my work.
6. The nearly 17% incidence of well-defined ulcer disease is significantly ($p<0.0001$) higher comparing it with gastroenterology patients undergoing endoscopy. The risk of ulcer disease is 1.69 fold (1.32-2.15 CI 95%) for a kidney recipient. There are no similar data of this ratio for numerous transplant patients in the literature. This observation is the third important novelty. The true prevalence of ulcer disease might be even higher, as a large proportion of it may not cause any symptoms.
7. The individual immunosuppressive drugs and combinations received seemed to have a significant impact on the patient's GI status. MMF was proven to increase to risk of erosions and the presence of CMV of the gastro-duodenal mucosa. Patients receiving TAC-MMF-ST regimen had the highest frequency of these.
8. The observed 20.9% frequency of biopsy-proven H. pylori infections in our study represented a highly significant difference ($p<0.0001$) comparing it the expected figures. This is my fourth important novelty. The rate of H.pylori did not change in time in our present material, and the age of positive and negative ones was the same. These results suggest that eradication happens at the very early peri-operativ period, when prophylactic antibiotics and AST are given together. Due to the constant use of AST, sensitivity of RUT was proven very low. We gave it up, and do not recommend it in that particular group of patients. The presence of H. pylori did not result in significant postoperative gastric complications. This finding suggests that ulceration in transplant recipients is a multifactorial process that may involve the interaction of acid secretion, H. pylori, immunosuppressive agents and other medication. Presence of H.pylori and CMV were independent from each other.
9. The rate of observed endoscopic alterations did not differ in the H_2RA and in the PPI group, indicating the equivalence of these two groups of AST in this setting. The only difference was in the presence of H. pylori, PPIs facilitated the eradication "by chance" more efficiently as it does in the general population.
10. I did not observe any impact of the renal function to GI complains.

11. The most important period for upper GI symptoms requiring endoscopy was the first year and particularly the first three months. Almost one third of the patients were investigated in the first year. In the first three months 29%, in the first year 26% of the endoscopic examinations revealed an ulcer disease. Out of 92 ulcers 29% developed in the first three months and 45.7% in the first posttransplant year.

Take Home Message: It seems worth to continue to scientific work on the relation between Helicobacter pylori and HLA-system. The importance of it to the everyday clinical practice is unpredictable.

Specific immunosuppressive drugs, opportunistic infections and other clinical circumstances that affect transplant patients are not seen frequently in the general practice of gastroenterology. Thus, the endoscopist at a transplant centre has to be able to recognize, identify, and treat the unique problems seen in a transplant population. While performing endoscopy obtaining biopsy samples is mandatory. Giving prophylactic acid secretion blockers, minimizing the number of pills a patient has to take a day and adopting a low threshold for endoscopy are among the most important measures that can be used to avoid GI complications after transplantation

6 Relevant publications

1. Seroprevalence of Helicobacter pylori in Central-European uraemic patients and its possible association with presence of HLA-DR12 allele Gábor **Telkes**; Katalin Rajczy; Marina Varga; Antal Péter; Zsolt Tulassay European Journal of Gastroenterology and Hepatology, September 2008, Volume 20, Issue 9:906-911 DOI: 10.1097/MEG.0b013e3282f824d9 **IF: 1,830**

2. HLA-DQ3 is a probable risk factor for CMV infection in high-risk kidney transplant patients Marina Varga; Katalin Rajczy; Gábor **Telkes**; Márta Hidvégi; Antal Péter; Ádám Remport; Maria Korbonits; János Fazakas; Éva Toronyi; Enikő Sárváry; László Kóbori; Jenő Járay Nephrology Dialysis Transplantation 2008; doi: 10.1093/ndt/gfn111 NDT, 2008, 23:2673-2678 **IF:3,154**

3. Endoscopic diagnosis of cytomegalovirus infection of upper gastrointestinal tract in solid organ transplant recipients-Hungarian single centre experience Péter A., **Telkes** G., Varga M., Sárváry E., Kovalszky I. Clinical Transplantation 2004:18:580-584 **IF: 1,635**

4. Comparing cytomegalovírus prophylaxis in renal transplantation: single centre experience M. Varga, Á. Remport, M. Hidvégi, A. Péter, L. Kóbori, G**. Telkes**, J. Fazakas, Z. Gerlei, E. Sárváry, B. Sulyok, J. Járay Transplant Infectious Disease, 2005:7:63-67

5. A gasztrointesztinális traktus cytomegalovírus-fertőzése szervtranszplantált betegeken
Péter A, **Telkes** G, Varga M, Járay J. Orv Hetil. 2008 Dec 21;149(52):2463-70.

6. Szervátültetett betegek gasztrointesztinális szövődményei **Telkes** G., Péter A. Családorvosi Fórum, 2004/5 pp.19.

7. A veseátültetés, **Telkes** G., Új Diéta, 2003.1. pp.7

8. A magyarországi szervtranszplantációkról, **Telkes** G., Új Diéta, 2003.1. pp.4-7

Abstracts of quotable presentations

1. HLA DR12 and DR 16 are risk factors of Helicobacter pylori infection for kidney recipients in Central-Europe G. **Telkes**, K. Rajczy, M. Varga, P. Antal, Z. Tulassay
UEGW, 2007, Paris, Gut 2007; 56 (Suppl III) A90 **IF:9,002**

2. HLA DR12 and DR 16 are risk factors of Helicobacter pylori infection for kidney recipients in Central-Europe G. **Telkes**, K. Rajczy, M. Varga, P. Antal, Z. Tulassay ESOT 2007, Prague Transplant International Vol 20.Suppl.2. Sept. 2007

3. Helicobacter pylori seroprevalence in haemodialysis patients before transplantation. Budapest experiences G. **Telkes**, M. Varga, A. Péter, Zs. Gálffy European Helicobacter Study Group, XVIth International Workshop, Stockholm 2003 Helicobacter, Vol. 8, No. 4., 2003, 395-6
IF:2,624

4. Helicobacter pylori infection of organ transplanted patients. Budapest experiences **G. Telkes,** A. Péter, M. Varga, Á. Remport XVth International Workshop on Gastrointestinal Pathology and Helicobacter, Athens 2002 GUT, Vol. 51., Suppl. No. II, A38, Sept. 2002,
IF:6,323

5. Helicobacter pylori seroprevalence in uremic, transplant recipients **G. Telkes**, M. Varga, A. Péter Zeitschrift für Gastroenterologie 5 Band XLII Mai 2004 p.:444 **IF.:1,000**

6. Helicobacter infection of organ transplanted patients **Telkes G.,** Péter A., Gálffy Zs., Remport Á. Dr., Zeitschrift für Gastroenterologie (5 Mai 2001, Band XXXIX, S:425) **IF : 0,803**

7. Diagnosis of cytomegalovirus infection in the upper gastrointestinal tract, following kidney and liver transplantation Antal Péter, Gábor **Telkes**, Marina Varga, Ilona Kovalszky, Adam Remport ESOT 2001, Lisbon

8. Upper endoscopy for organ transplant patient. Single centre experiences G. **Telkes**, A. Péter, J. Járay, ESOT 2005, Geneva

9. Helicobacter pylori seroprevalence in transplant recipients. Single centre experience **G. Telkes**, M. Varga, A. Péter XX. International Congress of the Transplantation Society 2004, Vienna

10. Felső pánendoszkópiák tapasztalatai vesetranszplantált immunszupprimált betegeken Péter A., Nemes B., **Telkes G.**, Szamosi Sz. MNT 1997, Pécs

11. Szervtranszplantált betegek Helicobacter pylori infekciója. Budapesti tapasztalatok **Telkes G.,** Péter A., Gálffy Zs., Remport Á. Magyar Transzplantációs Társaság III. Kongresszusa, Lillafüred, 2001

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